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THE ROLE OF THE ENTOMOLOGICAL MUSEUM[1]

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Before the turn of the Century, entomology was indeed a minor science compared with what it is today. What there was of it was largely limited to the field of taxonomy. There was no such thing as a professional systematist. Most systematic entomology was practiced as an avocation chiefly by physicians and clergymen. Museums were still relatively small, means of communication were poor, and most published work was based on private collections. Gradually these private collections found their way into museums. Museums gained financial support, sponsored expeditions, employed larger staffs, and ever added to the accumulation of research material.

More recently, coupled with the impetus of economic entomology, the museum is evolving into something new. There is an increasing number of trained professional systematists and skilled amateurs. Many of these have found it unnecessary to build large private collections but have come to depend on the museum as a source of research material. With modern service, the greatest utilization of museum specimens is now through use of the mails. The museum is becoming a concentration point and a mail order house for insects and the curator, an experienced shipping clerk whose diet is constantly supplemented by the glue of postage stamps and address stickers.

As one of these well-nourished, label-licking curators, I should like to take this opportunity to define some of the various functions of the entomological museum and to discuss some of its problems as I see them.

[1]Retiring presidential address read before the 208th meeting of the Pacific Coast Entomological Society, December 3, 1949. The views expressed in this paper are those of the author and do not necessarily reflect those of this Society or of the California Academy of Sciences.

First of all, we might note that museums and libraries have much in common; in fact, a library might be considered but a kind of museum. Beyond their constant current use, museums and libraries together comprise the link of knowledge between past and present generations and those of the future. Libraries preserve for future reference man's published data and ideas. Museums, whether dealing with the arts, history, or the sciences, preserve samples of his material things. In systematic biology, at least, there exists a very important bond between libraries and museums for it is usually possible to find lodged in some museum the very specimens upon which publication has been based. Since the all-important need for checking conclusions developed in the fields of morphology, physiology, the applied sciences, etc., is dependent upon a common denominator of identification, it follows that almost all branches of biology owe a debt to the museum; the checking point for these vital identifications.

The need for active museums in any field of biology varies directly with the degree of stability of its nomenclature, and the quality of its monographs. When any taxonomic group has been thoroughly sampled geographically, and when the type upon which each proposed name is based has been expertly studied, the importance of specimens in museums diminishes. It is not surprising that the value of a museum specimen viewed in this light decreases with the increased size of the species. For example, many will admit that the museum phase in the fields of mammalogy and ornithology is over. Thanks to a rather stable nomenclature, these sciences are now well along with more interpretive studies. For this reason it is surprising that most museums still have mammalogy and ornithology departments about as well staffed as ever whereas support for departments dealing with certain smaller forms of life is often non-existent.

Although we have been at it a long time, the museum phase of entomology is now hardly underway. The systematics of insects, even that of groups having great economic importance, is far from settled. This has often resulted in an unfortunate frequency of name changing and much criticism of systematists, especially by those engaged with applied problems. Beyond the ever-present human factor, much of the difficulty has been due to a failure to study available museum types and series. One might add also the common tendency to rely too much on what

is in museums with a resultant disregard of biology. Reference to what is available in museums is, of course, not as easily had as the uninitiated might expect. Types, if indeed extant, are scattered in museums all over the world and it is a costly and time consuming matter to see them all. Nevertheless, we must rely on the museum to preserve such material at least until all the problems of nomenclature have been settled.

In thus preserving and making available for use the specimens upon which the literature is based the museum performs one of its most important functions; namely, that of being a place where collections can be received, curated, and preserved for future reference.

Another important function of a museum is to act as a concentration point for unstudied specimens—the "raw material" of taxonomic research. A good part of such "raw material", of course, represents an assemblage of the unstudied portions of private collections. The major and most intriguing part, however, results from field expeditions sponsored by the museum. Any enthusiastic systematist eagerly scans such fresh accumulations because the thrill of new discoveries and vistas of new concepts is often his reward. When a museum fails to gather new material it is as dead and as unproductive as a machine without fuel.

I do not wish to imply that all new specimens are immediately studied. Any museum possesses vast assemblages of unstudied specimens. These need not be a cause for alarm. Entomology is far too extensive a field to have specialists studying all groups during any single period. In fact, many categories as high as the family level haven't yet had any serious attention. Sooner or later, however, someone will appreciate the fact that specimens have been stockpiled for his use in museums. He will thus be able to base his work at a much higher level than privately possible, see specimens from regions he may never personally hope to visit, and arrive at sounder taxonomic conclusions that could only result from an analysis of the maximum amount of data.

Museums go to considerable expense and labor in building up these materials for taxonomic research. It is the duty of the specialist to use this material in his work. Before publishing a

paper purporting to be a revision of a group, the worker should always ask himself, "Is this paper as complete as reference to all available accumulations in museums would render it?" If not, the worker would be committing one of the crimes of science in taking up precious publication space with conclusions that are not based on analysis of all data.

This brings us to the subject of the means of using museum facilities. All museums, of course, attempt to have table space and equipment for visiting scientists. Most often this is the only manner in which types may be studied. Obviously, however, it is impossible for a specialist personally to visit each museum in the course of a given taxonomic project. The only recourse is the ever-increasing practice of borrowing specimens through the mails. In this manner a worker can have before him at one time the often vast reservoir of specimens available in museums. Curators, because of pressure of other work, or a fear of losing specimens, unfortunately are not always eager to fill loan requests. They should realize, however, that it is one of their primary duties to honor any loan request made by a worker in good standing, or who is properly recommended. Unstudied specimens lying idle in museums at a time when revisionary work is being done might just as well be back in the field if they are not utilized during such fleeting periods of activity.

The worker on his part should realize that there are certain limits to a reasonable loan request. In general, curators dislike packing up large portions of collections that have been placed in definitive arrangement following more or less recent study by a recognized worker. In these cases requests should be limited to certain critical species. The worker should never expect to retain duplicates from series correctly identified by others except on an exchange basis. Certain collections, such as those of Leconte, Horn, and Casey, upon which a tremendous amount of nomenclature has been based, should never be freely loaned at least until the types or type series have been recognized and separated. Any portions of such collections that have not been mentioned in the literature need not be treated with such reverence.

In all the hundreds of loans this Academy has granted, we have had no losses in transport even in shipments to foreign countries. Any damage enroute has usually been due to improper packing rather than to rough handling. In spite of this, museums

do suffer some abuses, but these are so rare that they should not be an excuse for a discontinuance of the lending of specimens. Occasionally, though rarely, we have been unable to secure a return of loaned specimens. In some cases excessive series of duplicates, often the best specimens, have been retained in spite of the fact that workers should strive, for the good of all, to build up institutional collections rather than to reduce them. Most of the abuse, however, centers around the desire to possess holotypes. Much of this is legal but often borders on the unethical. I might cite one example passed on to me by my predecessor, Mr. Van Duzee. In this case a worker, having borrowed a few thousand unstudied western representatives of a family, discovered that a large number of new species were represented. Unfortunately for him, the types would have to be returned to this Academy. What did he do? He used the borrowed collection as an itinerary source for a very fruitful field trip. By visiting each of the potential type localities at the season indicated on our labels, he was able to secure and designate his own specimens as holotypes.

Abuses of the loaning privilege are more than offset by the contributions to science and the museum that result. The lending museum benefits by being able to make available to local workers authoritatively identified reference material enhanced in significance by mention in the literature. Most specialists will also try to fill in gaps in institutional collections with duplicates of needed species from their own collection.

Another function of a museum is to be a "specialist." Most museums are unavoidably regional in scope. They naturally tend to have the best collections from the areas in which they are located and workers elsewhere tend to depend upon them as sources for collections from such regions. There is also a desirable tendency to explore certain adjacent foreign regions that are faunistically related. Thus, for example, this Academy is a recognized source of research material from Western North America but has also developed large accumulations from North Western Mexico, Alaska, and the islands and shores of the Pacific.

Another form of museum specialty results from the research inclinations of its staff. The resultant development of outstanding collections in a taxonomic group is a desirable and an essential step toward making real published contributions. It is undesirable,

however, for curators of any period to decide that their institution will cease to build up collections of other groups. This can even be aggravated by such curators using existing general collections as exchange material to augment their specialized collections. Such taxonomic specialization is, however, quite admissable in cases where a broad, general collection is being actively maintained nearby by another institution.

A further function of many museums is to have a representative set of insects from a world standpoint. It is becoming increasingly evident that it is impossible to study intelligently any local fauna without a broad knowledge of genera from a world, but more particularly a European, standpoint. In many Orders higher categories have been very incompletely correlated from a world standpoint. There is a need for first hand examination, not a mere literature knowledge, of the type species upon which these categories are based. A good deal of the frequent changing of name combinations has been due to a tendency of certain workers to know only a limited fauna. As we study northward on our continent the need becomes more and more urgent to know the Palaearctic fauna. As we proceed southward, a knowledge of the Neotropical becomes indispensable. To fill this need with limited funds and staff is one of the challenging problems of our museums.

The educational function of entomological museums associated with universities is obvious. The separately maintained museum, however, has an opportunity to be of much broader service. Whereas the services of a university museum must of necessity be more or less limited to registered students and staff, the independent museum spreads its influence to all age groups. Very often it is the only place where youth, the post-university-age amateur, and the professional entomologist can find the means for pursuing his work. We take pride here at the Academy in the number of young people who profit by our efforts. Many have gone on into professional entomology, others continue as enthusiastic amateurs. Avocational entomology can add to the fullness of many a life and this fact alone could well justify the place of museums in our society.

A well balanced public museum should also provide adequate exhibits in the field of entomology. These should emphasize the local fauna and answer common questions.

So far I have tried to analyze some of the functions of the entomological museum. At this time attention might be given to some of its problems.

The major problem is that financial support of the activity is more in proportion to the size of the organisms involved than to the size of the job. Most museums receive material faster than it can be assimilated. The chief bottle neck is the lack of sufficient cases and drawers to arrange identified collections and thus make room for new material. Added to this is the lack of sufficient staff.

These shortages, it appears, all stem from the fact that museum activity, like that of a library, is very unspectacular. It fails to arouse the interest of the general public who these days is constantly being steeped in publicity about some new insecticide, antibiotic, advances in atomic and medical research, etc. Money today comes to the institution that is well promoted and has something understandable to promote. It is in the field of expeditions that the greatest chance for money drawing publicity can develop but here, unfortunately, the most fruitful collecting trips are simple, plodding affairs. The participants must return bearing a tale of a narrow escape from the embrace of a boa constrictor to attract much attention.

Most museums, to be truly scientific, tend to collect objectively all insects regardless of any known economic significance. Because only a very small percentage of the vast insect world directly affects man's welfare, it follows that a proportionately small percentage of museum activity can be justified on economic grounds. There is, however, great cultural value in objectively knowing the inhabitants of this planet, their habits and distribution. Our alternative is to remain ignorant of such things and this is unthinkable. This is a difficult idea, however, to get over to a materialistically minded public and the various legislative bodies controlling appropriations. No one seems to demand an economic return from certain other cultural pursuits of man such as his art and music but when it comes to science, the public has been educated to expect immediate and tangible returns. This situation is often aggravated in the privately endowed museum which is free from the pressure of the tax payer. Here there is a tendency to engage purposefully in research that has no eco-

nomic bearing. This, although almost suicidal, is as it should be. Work on insect groups having economic importance can be well justified in tax-supported institutions. If the worker in the private museum clamors to work in these fields too, who will be left to study the non-economic groups which constitute the bulk of the insect world?

With the steady decrease in private fortunes, the hope is not too good for any great increase in financial support for the needed expansion of independent museums wherein most of the major insect collections are lodged. With this in mind, systematists should perhaps search for ways in which they can work more efficiently under existing conditions.

Undoubtedly the greatest single boon to progress would be a relaxation of institutionalism and individualism in regard to types. In this country, at least, types are so woefully scattered and often so poorly curated that many workers try to get along without reference to them. This often results in errors that might well have been avoided. With so much work to be done and so few to do it, we cannot afford to have to continually go back to correct errors. Every revision should have its nomenclature firmly fixed by reference to types.

Is it not too much to hope for a central institution whose function is to concentrate types or information about types? This would mean a pooling of all available types in this country in one safe place. Workers could then, in a relatively short time and a limited journey, speed their work immeasurably and be able to accomplish more in a lifetime. Space in journals would be more efficiently used, concepts of species would be less provisional, and the value of each publication would be more lasting.

Such an institution could be built around a file covering the citation, data, and institutional location of the type, or potential lectotype, for every name proposed for insects and their relatives. This file would be of great value in itself but the ideal objective, (of course unobtainable) would be to possess a type specimen for every name. It might be possible to exchange types of exotic species present in American museums for types of American species deposited abroad. This, of course, would not be so vital in cases where types of a given group are already concentrated in one institution. In cases where types cannot be obtained, each

worker who goes abroad to see them could contribute compared specimens together with copies of his notes, drawings, and photographs. In many of the older collections, of course, types are not yet clearly determined. Such types would not be separated from the parent collection until they have been clearly worked out by a good specialist. Workers actively engaged in continuous research in a group would be permitted temporarily to hold the types they create as long as they are needed. A policy of making publication of a new name in a journal contingent on such eventual deposit would not be unreasonable. If a worker expects the world to recognize his new name, he should willingly place its type where it is available to all.

I am sure the immediate reaction of many curators to this proposal will be one of horror, but most of this horror I believe would be based on unscientific selfish reasons. *It is not the purpose of types to make an institutional or private collection valuable or indispensable.* Admittedly it would mean that some museums would give up more than others. As matters stand, however, no institution is self-sufficient in regard to types and all stand to gain in the long run. What is really important is that our ponderous science would advance more rapidly with unwavering, steady steps.

The question immediately arises as to the location of this depository. I am sure that the authorities of the United States National Museum would feel that theirs is the logical place. This might be so if the National Museum was itself logically located. But in this day we have very little assurance that Washington, D.C. will not be a prime target in a future war and as long as there is even a remote danger of such an unfortunate happening, it, or any similar potential target area, is not the place for a museum. Furthermore, the climate of Washington, D.C. is far from stimulating during the summer months when most workers are free to study types.

I really didn't intend to start a discourse on the location of the National Museum, but now that I have, I might as well state my opinion. This highly important national collection deserves a much better deal than it is getting. A country as rich as this should be well able to quarter and staff this worthy activity under much better circumstances. Anyone who has recently visited this

museum and has noted the crowded research conditions in Entomology well knows of what I speak.

There is no good reason why the exhibit and research functions of the National Museum, or any other museum for that matter, need be in the same building or vicinity. The exhibits could take over the entire present structure and the research activity should be given a separate, specially designed building with ample space for expansion and for visiting workers. Most of all, since a fresh start is already needed and a move must be made, it should be moved to some smaller, non-industrial community with a good climate and a pleasant natural history environment. Under such conditions I am sure that the health of that rare species, the museum systematist, would be improved and he would spend much less time and energy in getting between his home and his desk.

Many will propose that this dream institution should remain on the Atlantic seaboard. Actually, however, the West and Middlewest are growing and there is a strong case for a more central location. There are already a number of large museums along the Atlantic Coast and the moving of the National collections would not leave too great a void for workers in that region. The identification service of the Department of Agriculture would benefit by shorter mailing distances as well. Should the National collections be adequately housed and more favorably located, I am sure that many workers would favor the concentration of all types in that collection. Such types should, of course, be housed in special rooms and there should be a provision for a permanent and adequate staff to care for them. The problem of past commitments regarding the permanent ownership of types in the various museums might be overcome by the use of indefinite loans. The policies and management could be under the surveillance of a democratically selected board of curators representing the various institutions contributing to the pool.

The Pacific Coast for many years has had, with minor exceptions, such a central type depository here at the California Academy of Sciences. The present proposal is merely to extend this principle to a National scale.

Perhaps this idea is too visionary and, because of man's inherent selfish nature, may never be put into effect. It would be interesting, however, to hear the reactions of systematists.